DOCUMENT RESUME

ED 396 975 SO 025 957

TITLE	Design in the Classroom: Exploring the Built Environment.
INSTITUTION	Maine Arts Commission, Augusta.
SPONS AGENCY	National Endowment for the Arts, Washington, D.C.
PUB DATE	[93]
NOTE	39p.
AVAILABLE FROM	Maine Arts Commission, State House Station #25, Augusta, ME 04333.
PUB TYPE	Reports - Descriptive (141) -- Guides - Classroom Use - Teaching Guides (For Teacher) (052)
EDRS PRICE	MF01/PC02 Plus Postage.
DESCRIPTORS	*Architectural Education; Architecture; Art Activities; Art Education; Building Design; Building Plans; *Built Environment; Community Cooperation; Design; *Design Requirements; Elementary Education; Interdisciplinary Approach; School Community Relationship; Site Development; Structural Elements (Construction); *Visual Environment
IDENTIFIERS	Bridge Design; *Maine; Playground Design

ABSTRACT

Design and the built environment are subjects of concern to Maine communities. State mandated town planning, new school construction, and the Department of Transportation plans to rebuild roads and bridges elicit public discussion. The study of design encourages elementary students to enter this public forum as informed citizens. The study of design in the built environment requires use of mathematics, scientific, reasoning, visual, spatial, and verbal skills, and provides opportunities for interdisciplinary learning. This sampler describes four projects resulting from a 1992 Design Education grant intended to promote design awareness in the public schools. The projects took place over the course of a year and involved collaboration among community architects, planners, engineers, and the school. Each project presented includes a description of the school/community culture, the framework or plan for the entire course of design study, and a sample lesson. Projects represented include: (1) "Marada Adams Community School Playground: A School and Community Design Project, 1992-1993"; (2) "Hiram Elementary School Bridge Project"; (3) "Young Designers: Dresden Elementary School"; and (4) "Bowdoin Central School Students: Design A New School." Each project concludes with a bibliography. (MM)

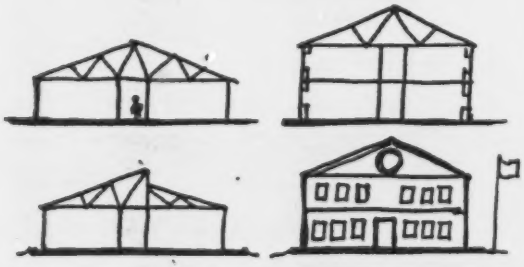
****
* Reproductions supplied by EDRS are the best that can be made *
* from the original document. *
****

ED 396 975

ADAMS SCHOOL NEIGHBORHOOD AREA SCAVENGER HUNT
LOOK FOR THESE THINGS!
HERE'S AN EXAMPLE OF HOW TO DO THIS
Adams School B Yellow
TRY TO FIND ONE FAVORITE THING YOU HAVE SEEN TO TELL ABOUT WHEN YOU RETURN!

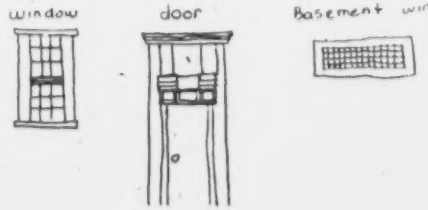
Bridges I

■ Sections & Elevations



courthouse

· wayne Perkins grade 5



SO 025 957

BEST COPY AVAILABLE

Funded through a grant from the National Endowment for the Arts

PERMISSION TO REPRODUCE AND DISSEMINATE THIS MATERIAL HAS BEEN GRANTED BY

Nancy Salmon

TO THE EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)

U.S. DEPARTMENT OF EDUCATION
Office of Educational Research and Improvement
EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)

X This document has been reproduced as received from the person or organization originating it.

☐ Minor changes have been made to improve reproduction quality.

• Points of view or opinions stated in this document do not necessarily represent official OERI position or policy.

Design in the Classroom: Exploring the Built Environment

In 1992, the Maine Arts Commission received a Design Education grant from the National Endowment for the Arts to promote design awareness in the public schools. At this time, many of the state's schools are restructuring, creating a new approach to learning which integrates various subject areas. The study of design, particularly of the built environment, uses mathematic, scientific, reasoning, visual, spatial and verbal skills.

Design and the built environment are subjects of current concern to Maine communities. Public discussion and controversy surround the activities of state mandated comprehensive planning for towns, the construction of new schools, and Department of Transportation plans to rebuild roads and bridges. The study of design will prepare and invite students to enter this dialogue as informed citizens, to engage them in meaningful work and leave them with the knowledge that they can transform their environment. In this dialogue, teachers, students, designers and community members learn from each other.

We offer Design in the Classroom as a sampler of four projects which took place over the course of the year. Each project was a collaboration among community architects, planners, engineers, and the school. Each project describes the school/community culture, the framework or plan for the entire course of design study, and includes a sample lesson. The text of each project description was developed by all collaborators at each site. The Dresden, Bowdoin Central and Adams project descriptions are each presented in the voice of the designer. The Hiram project is presented in the voice of the principal.

Design in the Classroom is intended to offer new ideas and possibilities for integrating design elements into your teaching plans. It is not a syllabus to be followed from one lesson plan to the next. We hope this document will provoke your imagination and present four new approaches to teaching. A bibliography and funding information is included. Further information on the projects can be obtained by contacting the schools and the designers.

The Projects

Marada Adams Community School Playground
page 2

Hiram Elementary School Bridge Project
page 9

Young Designers: Dresden Elementary School
page 18

Bowdoin Central School Students Design a New School
page 28

Project Coordinators:
Dianne Ballon
Sharon Townsend

Marada Adams Community School Playground: A School and Community Design Project, 1992-1993

Project Overview

This project grew out of work done by The Education Committee at Greater Portland Landmarks. We saw the Marada Adams Community School as an opportunity to involve students and staff in the design of a playground for which funds had already been appropriated. We submitted a grant to the Maine Arts Commission and upon the notification of funding, began the project in earnest in January 1993.

We use the word "playground" here to include all of the grounds surrounding the school which are used by the public. They currently include much pavement, as well as play equipment and a basketball court. During spring of 1993, we worked with teachers, 2nd and 3rd grade Adams School students, and a class of King Middle School students. The work culminated with the construction and presentation of site models. We presented a basic site plan to the city engineering staff in June and hoped that construction of the playground would start this fall, but it has been postponed until Spring or Summer of 1994.

Subject Areas

Social Studies
Neighborhood History
Language
Interviewing, Narrative Writing, Vocabulary
Math
Measuring, Size/Scale, Mapping
Science
Compass Use, Properties of Materials
Art
Climatic Effects on the Site
Drawing, Color, Texture, Pattern
Neighborhood Buildings

Key Collaborators

Jenny Scheu
Project Coordinator
Portland Architect and founder of Learning By Design
Deidre Steiner
Principal, Marada Adams Community School
Peg Richard
Marada Adams Community School Art Teacher
Walter Rumery
King Middle School Teacher
Steve Pondelis
Neighborhood Architect, Volunteer
Kai Jacob
Playground Designer and Presenter from Kennebunkport
Kit Clewes
Playground Designer and Presenter from Portsmouth
Virginia Edwards
Adams School Parent and energetic Volunteer par excellence
Linda Campitelli
Marada Adams Community School Teacher
Bonnie Pulsifer
Marada Adams Community School Teacher
Rene Custeau
Marada Adams Community School Teacher
Patti Perkins
Greater Portland Landmarks Education Committee

Alison Noiles
Neighbor, Volunteer, Head of Hill School
Pat Anderson
Art Historian, University of Southern Maine
Vicki Bonebakker
Director of Academic and Cultural Collaborative
Howard Rowe
Deering High School English Teacher
Tom Chaisson
Lyman Moore Middle School Art Teacher
Alice Spencer
Neighborhood Artist and Landmarks Board Member
Martha Deprez
Director, Greater Portland Landmarks
Ellen Belknap
Neighborhood Architect, Volunteer
Scott Benson
Neighborhood Architect, Volunteer
Rob Hoover
Landscape Architect, Presenter
Leslie Forbes
Presenter on gender-specific play
Larry Mead
Director, Portland Recreation Department
Noni Ames
Omstead Alliance, Presenter
Betsy Iglehart
Historian, Volunteer
Carol McClure
Neighborhood Cummings Center Director
20 King Middle School Students
60 Marada Adams School Students

Activities

Early on in the project, we held a volunteer/staff kick-off meeting after school. Playground designer, Kit Clewes showed slides of playgrounds he designed which were built by Community Volunteers. Noni Ames talked about the development and history of the green spaces in Portland. She described Olmstead's concept of green spaces which was guided by the notion that each green space did not have to provide every amenity, i.e., some could include trails and special gardens, others would include tennis courts and other recreational activities. She urged staff and volunteers to provide amenities which the nearby Eastern Promenade park did not provide. Our final presenter was Leslie Forbes, who spoke of her research on gender specific play.

Volunteer Ginny Edwards provided refreshments. The event was well attended by volunteers, teachers and a large contingent of volunteers and board members from Greater Portland Landmarks. Throughout the project there were countless planning sessions. Key activity planners were Peg Richard (Adams School), Steve Pondelis (Architect), Ginny Edwards (Parent), and Jenny Scheu (Project Coordinator).

Four Preliminary Design Activities

1

Draw a picture from a *written* description of place. Our intent was to have students draw from the description and see how each had a different "mind's eye view" of the same written paragraph.

2

Rob Hoover, Landscape Architect, showed slides of wonderful landscapes, and students loved them; especially the real fantasy environments and beautiful outdoor spaces. Clearly while you can turn to existing city spaces for inspiration, even these are pale by compari-

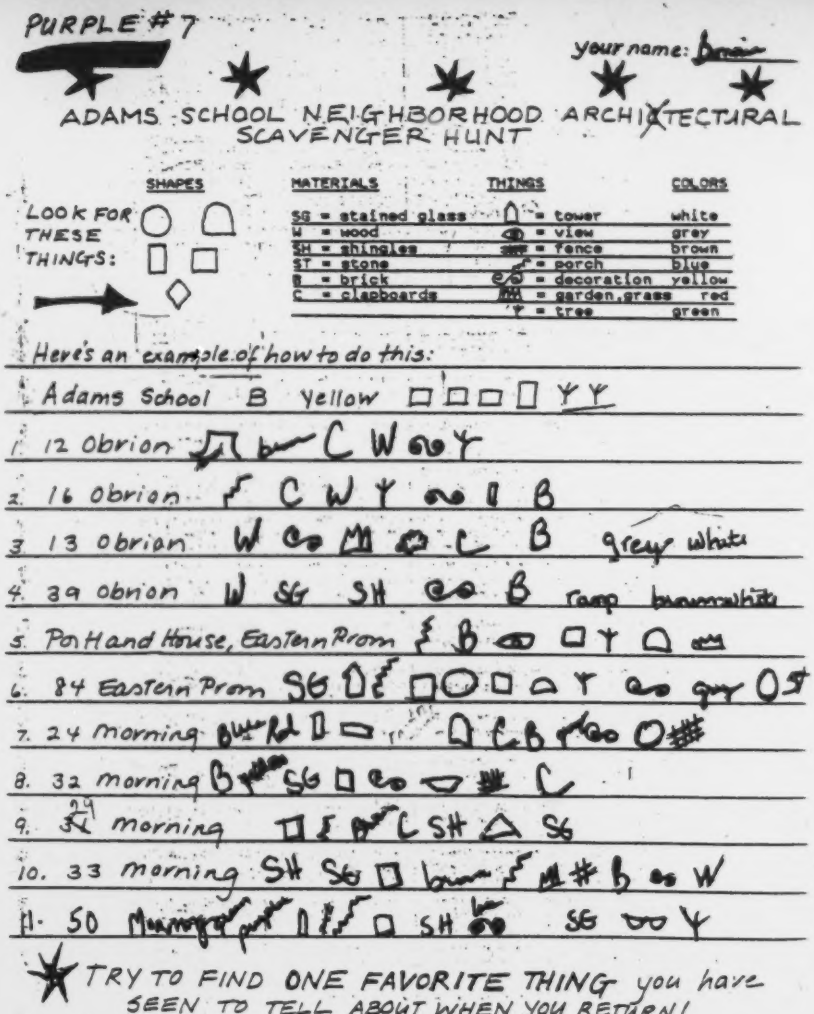
son to some outstanding examples from all over the world. Why just replicate the norm? Why not aspire to much greater things?

3

Playground designer, Kai Jacob, showed slides of playgrounds. After viewing his presentation, students were asked to draw fantasy playgrounds.

4

Second and third graders went on a field trip to visit the architectural offices of SMRT in Portland. We wanted students to understand that people actually do design work every day and make a living at it. Each student can grow up to do whatever they dream, to design their own life path!



Architectural Scavenger Hunt

To prepare students for the hunt, we showed slides of the neighborhood and some exceptional non-neighborhood buildings. We picked thirty buildings in the Munjoy Hill neighborhood, within a five block radius of the school and divided the students into six teams of six to ten students and two adults. Each group walked on a special route to observe ten buildings. Students were equipped with cardboard "clipboards" (an activity sheet taped to a 9"x12" piece of heavy cardboard), a pencil and a small compass, donated by L.L Bean.

At each building, students were to observe many characteristics: shapes, materials, color, plantings, views, et. al, and note them on their clipboard using special symbols. Each student was to find one special thing to share with the group.

Playground Design

Our final activities related to the school playground site:

1

King Middle School students arrived with tape measures an worked on an actual tenth scale model of the playground site. This model was built of cardboard and showed the residential buildings adjacent to the site. Steve Pondelis, an architect volunteer, worked closely with students on transcribing their field measurements to a reduced scale and constructing a model. These students had been working on an overview of green spaces in Portland. The middle school students had looked forward to working with the elementary students.

2

Questionnaires were sent to each students' family to ask how they felt about the playground and what changes could be made.

3

Students talked with other students about the qualities which make green spaces and play spaces fun to be in. Students drew up a list of qualities they wanted to see on their own school site.

4

We discussed the fact that the actual budget for the site changes was not large enough to convert the site into a huge playground full of new play equipment.

We discussed the needs of others in the community who use the space.

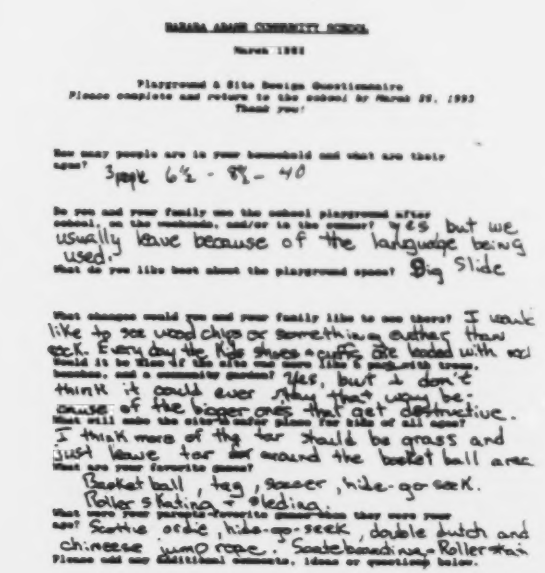
5

One requirement of the City was the construction of a new basketball court. Students had to decide where the court should be located.

Models

1

Each of the six groups of Adams School students designed and built a model of their proposed playground. They were provided a grab bag of model making materials and a cardboard base for each model which was to fit into the larger "context" model made by the King Middle School students.



BARBARA ADAMS COMMUNITY SCHOOL

March 1993

Playground & Site Design Questionnaire
Please complete and return to the school by March 29, 1993
Thank you!

How many people are in your household and what are their ages? 3 ppl 6½ - 8½ - 40

Do you and your family use the school playground after school, on the weekends, and/or in the summer? yes but we usually leave because of the language being used.
What do you like best about the playground space? Big Slide

What changes would you and your family like to see there? I would like to see wood chips or something rather than rock. Every day the Kids shoes + cuffs are loaded with rock Would it be okay if the site had more like a pedestrian street, benches, and a community garden? Yes, but I don't think it could ever stay that way be- cause of the bigger ones that get destructive.
What will make the elderly and/or plans for bike or all ages?
I think more of the tar should be grass and just leave tar or around the basket ball area
What are your favorite games?
Basket ball, tag, soccer, hide-go-seek.
Roller skating + sledding.
What were your parents favorite games when they were your age? Scottie oodie, hide-go-seek, double dutch and chineese jump rope. Skateboarding + Roller skating
Please add any additional comments, ideas or questions below.

I think there should be additional small basket-ball hoops. The bigger ones take them over + the little one's never get to play. It would be great to have a guard on duty in the summer to stop the profaned language, motorcycles and fights so the younger ones can enjoy it.

The groups worked on their models for a total of four hours (two 2 hour sessions over two weeks) with the help of older King Middle School students. Each group presented their model and enjoyed seeing the great variety of solutions to the same problem. The fact that there is no right answer is the most wonderful and empowering aspect of learning about design!

3

The common feature of all of the playground designs was changing the existing large areas of pavement to grass. Several of the groups got so excited about their models that they added many of their own special materials to make their own models very elaborate.

At the end of the school year the volunteer architects reviewed all student models of the site and focused on the actual budget for construction. They prepared a plan to submit to the Portland City Engineers. Because of a backlog of construction projects and a shortage of staff, the project was not scheduled for construction in 1993. Larry Mead of the Portland Recreation Department has indicated that the project will likely be postponed until the end of the '93-'94 school year.

Project Strengths

The redesign of the Adams School playground was a "real" project. Students' imaginations are so vibrant. It was fun and easy for them to dream about making changes to their inhospitable site. They especially loved being outside in the neighborhood, and I think both students' and teachers' eyes were open to the myriad of spaces and building details right in their own backyard.

Children love to make models. Reaching a group consensus about what their own design should be was a learning experience. Several parents were very excited

about the project. Involving the middle school students was a big hit with the younger children.

We learned about project organization and grant writing. We learned about the critical importance of good communicating for the success of a project.

Project Weaknesses

- Perhaps the biggest structural problem was scheduling between King and Adams School staff. Each school really worked on their own and only got together for the two model making afternoons.

- The project itself would have been more effective if it had been more intensive, i.e., two+ activities per week for four weeks, instead of one per week for six weeks.

- Spend more time with both elementary and middle school students on the concept of scale. We should have made the models a larger scale as they were hard to work on at such a small scale.

- Throughout the course of the project, we could have used more community participation. With hindsight, we should have leaned more on the parent organization at Adams School. We hope that as the site is renovated, there will be room for community participation and certainly for community celebration.

Summary Comments

Jenny Potter Scheu
Architect and Project Coordinator

I think many people were and are excited about this project. The children gained insight into the nature of quality space and into their own eastern Munjoy Hill neighborhood. We were certainly encouraged at every turn by Deidre Steiner, Principal at Adams School. I think the project has inspired Greater Portland Landmarks to put a greater emphasis on work in the Portland Schools and to working with their own future constituents. Their own organization and more importantly, the City, will benefit from making the concern for good design and planning an important part of citizenship.

This project has only strengthened my own commitment to the importance of design education and the involvement of community professionals in local school programs. And finally, we are not complete. We plan further school activities and a community playground effort for fall 1993 and winter 1994.

Funding for the Adams Project

Maine Arts Commission
Marada Adams Community School PTO
Professional Supporters

We more than topped our cash / in-kind support as we had so very many volunteer hours. Our supply cost was lower owing to donated materials. Teachers asked that their pay go toward the purchase of a water fountain for the site.

Bibliography

If you could buy ONE book for your school library, *Architecture in Education: A Resource of Imaginative Ideas and Tested Activities*, should be the one. The book is available for $20.00 from: The Foundation For Architecture, One Penn Center at Suburban Station, Philadelphia, PA 19103. Telephone: (215) 569-3187, FAX: (215) 569-4688.

Another terrific resource is: "ArchiSOURCES Catalog" from the Center for Understanding the Built Environment. They have a wonderful Newsletter, a catalog of supplies and great ideas from all over the world. Write or call: (CUBE), 5328 West 67th Street, Prairie Village, KS 66208. Telephone: (913) 262-0691.

Abhau, Marcy, ed., with Rolaine Copeland and Greta Greenberger. *Architecture in Education: A Resource of Imaginative Ideas and Tested Activities.* Philadelphia, PA: Foundation for Architecture, 1987.

American Architectural Foundation. *The Pocket Guide to Architectural Education.* The American Architectural Foundation, 1735 New York Avenue, N.W, Washington,D.C. 20006.

ArchiSOURCES Catalog. *The Center for Understanding the Built Environment.* Prairie Village, KS.

Balaban, Richard C. and Alison Igo St. Clair. T*he Mystery Tour: Exploring the Designed Environment with Children.* Washington, D.C: National Endowment for the Arts, 1976.

Devlin, Harry. *To Grandfather's House We Go: A Roadside Tour of American Homes.* New York: Four Winds Press, 1967.

Gibbons, Gail. *Up Goes the Skyscraper.* New York: Four Winds Press, 1986.

Isaacson, Philip M. *Round Buildings, Square Buildings, & Buildings That Wiggle Like A Fish.* New York: Alfred A. Knopf, 1988.

Macaulay, David. *Underground.* Boston, MA: Houghton Mifflin Company, 1976.

Shaffer, Carolyn and Erica Fielder. *City Safaris: A Sierra Club Explorer's Guide to Urban Adventures for Grownups and Kids.* San Francisco: Sierra Club Books, 1987.

Sobol, Harriet Langsam. *Pete's House.* New York: Macmillan Publishing Company, 1978.

Symonds, Hilda, ed. *The Teacher and the City.* Toronto: Methuen, 1971.

Trogler, George E. *Beginning Experiences in Architecture: A Guide for the Elementary Teacher.* New York: Van Nostrand Reinhold Company, 1972.

Hiram Elementary School Bridge Project

Project Overview

Hiram Elementary School is a rural Maine School with approximately 70 students, grades K through 7. Combined grades include: a K-3 multi-age classroom, a 4-5 classroom and a 6-7 classroom. Students in the combined 4-7 grades have a yearly challenge of forming "companies" to design and construct toothpick bridges according to set specifications. The excitement and interest experienced by the older students was communicated to the younger students who asked for the opportunity to construct their own bridges. Each year the project is modified to challenge students in new ways and is a highlight of the school calendar.

During the 1992-1993 school year, Hiram teachers, the district's art teachers and STAR Science Center, (a non-profit educational organization working with students to integrate the arts and sciences), began to develop an open-ended bridge construction unit for all students based on the natural and constructed bridges of the surrounding communities. Three major components of the unit include:

I Bridge Design

Students gained skills in geometry, measurement, and structural design. Art projects included the study of bridge design and students created bridges based on their studies.

II Bridge Construction

Students worked with a variety of materials to construct bridges to meet diverse specifications including budget and size.

III Study of Area Bridges

The Hiram Historical Society provided information and resources concerning the history of bridges in Hiram and the surrounding communities. Students took field trips to the Naples draw bridge, Songo locks and the Hiram railroad bridge to observe bridges first-hand.

At the Hiram railroad bridge which spans the Saco River, students sat on the bank of the river and drew the bridge from different angles. Older students counted the number of beams and measured a sample of beams. This information was later used to determine the size of the bridge.

Subject Areas

The Hiram Bridge Project integrates mathematics, science, design technology, music, art and literature. The instructional format for all activities is cooperative learning. Students studied structural design, technology, social history, business organization and geometric principles. Skills learned include: observing, measuring and recording data, experimenting, classifying, drawing conclusions, controlling variables, graphing results, predicting, constructing, journal writing, bookkeeping, making spread sheets, large and small group cooperation, and giving presentations.

Key Collaborators

Cathy Adleman
Art teacher, grades K-3, district
Frances Eberle
Director, STAR Science Center
Cathy Geren
Art teacher, grades 4-7, district

Patricia Hesslein
Team teacher, grades K-3, multi-age classroom
Tom Kenny
Teacher, grades 6-7
Cyrene Slegona
Teaching Principal
Janet Wiley
Teacher, grades 4-5
Donna Wolfrom
Team teacher, grades K-3, multi-age classroom

The Hiram school teachers have worked as a team and with students on whole school projects for five years. We have developed innovative learning experiences to meet the specific educational needs of our students. Our goal has been the development of a strong school community that values both individual strengths and group interdependency. Cooperative learning has been extensively used at all grade levels. Cooperative activities range from small groups to activities that include all students, teachers and parents working together.

Guest Presenters

In previous years, guest presenters have included civil engineers from the Maine Department of Transportation and local businesses, as well as the bridge project manager for the Hiram bridge constructed last year. This year a number of presentations were made to the students by Eleanor Twitchell, a representative of the Hiram Historical Society, about the history of Hiram's bridges and those in surrounding communities.

Activities

All students watched the video, "All About Bridges". Students in the upper grades discussed the types of bridges seen and their uses. Problems encountered in the construction of bridges were also discussed.

The K-3 Approach

The K-3 students watch the video and take notes. After the video, teachers record the information gathered by the children. Teachers classify the information (i.e., shapes that are noticed, materials used, problems, etc.) and it is recorded on chart paper.

Students sort pictures that they have brought to class, noting different building materials, shapes, bridges with arches, what the bridge spanned, etc. They graph the pictures on a large floor graph.

Teachers make a "paper river" that flows through the classroom, wider in some sections and narrower in others. Children are grouped into "construction companies" consisting of four workers. They choose a name for their company and decide on the best location for their bridge.

A. Building a Bridge

A variety of building materials such as short blocks, Bristle blocks, Legos, Lincoln Logs, and popsicle sticks, are made available. No materials are available that are as wide as the river. Some materials not suited for building are also provided like cloth, foil, yarn and paper. This provides students with the opportunity to determine the best building materials. Children are able to choose any combination of materials for their con-

struction. Allow a long period of time for this project, as the children build and rebuild as they problem-solve.

Bridge Specifications:

1

A 2" X 2" boat must be able to pass under the completed bridge.

2

A matchbox car must be able to travel across the bridge; therefore, ramps are necessary.

Each company draws a picture of their bridge in their journal, records what was used for building material, reflects on the building of their bridge (problems, solutions, group cooperation, etc.), and estimates how much weight their bridge will hold.

Judges use metric weights to perform a stress test on each of the bridges. Companies decide where to place the weights for the test. They continue to place weights until the bridge begins to collapse. Companies will record the greatest weight the bridge can hold in their journals.

B. Building Materials

Materials that were not used to construct bridges are discussed by the children. They discover that bendable materials are not suitable for building. Children then meet with their construction companies. Each company is given a set of materials such as straws, cardboard, wire, toothpicks, paper clips, tinker toys, blocks, rubber bands, foil, cloth, tongue depressors and pipe cleaners. The companies experiment with the materials and categorize them on the chart provided. When the activity is completed, companies meet in a large group to discuss which materials are best for bridge construction and why.

C. Bridge Geometry

In a large group, students look at pictures of bridges and make a list of noticeable shapes. Students then divide into "construction companies". Each group is given many 1" X 8 1/2" oaktag strips (with a hole punched in each end), and a supply of paper fasteners. Each group will make four closed figures and decide which figure best holds its shape. Each recorder will draw the shape and record the information in the company journal. Students gather in a large group and sit in a circle, placing their figures in front of them. By looking at the figures, students will determine categories and graph figures accordingly.

After graphing, discuss which shapes are the strongest. If students have not discovered that triangles are the strongest shapes, companies will meet again for further exploration. They will make 3, 4, 5, and 6-sided figures and determine how to make them better hold their shape, recording findings in their journals.

Grades 4-7: Bridge Building Competition (16 days)

Students are assigned to a company of four employees based on individual strengths and grade level (one student from each grade per company). Each student has a job description and responsibilities. This makes it likely that each student will have the opportunity to work at each of the jobs as they progress through the grades. Job descriptions include project director, architect, carpenter and accountant.

Companies work with a budget of $150,000,000 to build a bridge of their own design with lumber (tooth picks) and welding material (glue). Bridges must be built to specifications that are announced at the beginning of each competition.

Bascule Builders
1992 Bridge Competition

Monday, March 9

Last week we made experimental bridges.Our bridge had the lowest amount of weight compared to the other bridges, also our bridge was to short so it didn't break but was pulled off the stress testing stands.Today our architect,Ryan Randall is starting to design our real bridge.Our companie's sign is also being created by our accountant,Becky Hayford.The project director is Teddy Chernesky, the architect is Ryan Randall, the accountant is Becky Hayford, the carpenter is Kenny Harmon, the transportation chief is Mike shadwickc.

Friday, March 20

Today we made a six thousand dollar mistake because of inflation the price of materials doubled.So when we went to buy lumber we didn't pay enough money but we didn't discover this until all the lumber was welded on but we luckily had enough money to pay the debt.But paying the debt left us unable to buy any more lumber so building wise were BROKE.

Students determine their job assignments within their company by consensus. Individual company members may not ask for assistance from teachers. Any problem, including personnel conflicts, must be worked out by company members. Only when everyone agrees that they are not able to resolve the conflict, may the project director write a letter to the supervising teacher to request assistance. Company members are answerable to each other concerning the quality of their work and cooperation.

During the first week companies experiment with various geometric structures to determine possible designs for their bridges. This includes working with a variety of beam structures, geometric organization of beams, and identification of stress points. The history of bridges, types and categories of bridges are also studied. Students are encouraged to look at bridges aesthetically. Companies are encouraged to design and implement their own experiments to help them build the strongest bridge possible.

Companies have 10 days to design and construct a bridge. They create a company name, letterhead stationery and a company sign. Blueprints are submitted to the supervising teacher for approval before construction may begin. Only materials from a teacher owned supply company may be used ($10,000 per piece of lumber, $40,000 per set of blueprint paper).

- A daily journal is maintained by each company.
- Purchase orders, checks and spread sheets are updated as needed.
- Work site fines are imposed for messy or unsafe conditions.
- Maine state sales tax is imposed on all purchases.
- Bonuses are awarded to companies for exemplary work.

At the end of each work session (which averages 1.5 hours per day), all companies meet to discuss their accomplishments and problems of the day. Students learn from each other's experience and share ways of solving problems. The frustrations of the task are related to real life situations. These sessions are exciting and valuable for all participants.

.R & R Bridge Builders
Bridge Building Competition, 1992

March 11, 1992

Our company started to draw out the plans for the bric we are making. Jacob was drawing and measuring out the height and length of the land. Jody and I colored our bc and truck, while Troy was drawing the plans to our bridg We thought we were ready to show our plans to the Sirus Lumber Co. but when we showed them to Mr. Kenny, we foun that our plans weren't the same as we thought Troy had measured. We were lucky enough that we could go back and correct the mistake.

Bridges Inc.

35 Main st P.O. Box 204
Hiram, ME 04041

BALANCE SHEET

Company Name Principals Worst Nightmare

Beginning balance: $1,550,000.00

Check number	Date	To whom check is written	Check amount and balance
001	3/8/93	I saw Lumber company	amount 530000
			balance 1020000
002	3/8/93	I saw Lumber company	amount 42,400
			balance 977600
003	3/12/93	I saw Lumber company	amount 64,501
			balance 913099
004	3/16/93	Ursus Horribilis inc.	amount 42,400
			balance 870690
005	3/16/93	Ursus Horribilis.	amount 401
			balance ~~869,789~~
006	3/16/93	Principals worst Nightmare	+amount 500
			balance 87289
007	3/16/93	I Ursus Horribilis	amount 03600
			balance 80689
008	3/17/93	Ursus Horribilis	amount 234101
			balance ~~570,588~~
009	3/17/93	Ursus Horribilis	amount 33,000
			balance ~~213,088~~ 233288 137501

16

BEST COPY AVAILABLE

Stress Test

The final task was a stress test. Companies estimate the gram weight they think their bridge will support. Weights are suspended from the middle of the bridge to test its strength. Weights are added until the bridge collapses. The total weight prior to the bridge collapse is the final weight recorded. The winning bridges have tolerated over 2,000 grams.

Suggestions for changes in the competition for the next year are made by students based on their experience. For example, next year companies will have an opportunity to reinforce their bridge at the place where it broke to see if reinforcement increases the amount of stress their bridge can tolerate. The goal is to have students run the project totally during the next school year.

While the idea for this competition initially came from Building Toothpick Bridges by Jeanne Pollard, students and teachers of Hiram have developed a learning experience that is extensive and unique. This project will grow each year to challenge our growing expertise.

Summary Comments

The bridge unit has been a rich, rewarding experience for all members of our school community. We have learned to look at our physical and historical environment in a new light. Students have experienced an advanced level of independent and interdependent work from which they gained knowledge and experience in applying that knowledge. They also experienced the joy of drawing their own conclusions and sharing their new knowledge with their peers and visitors. While there have been many problems to work out, they were part of a valuable learning experience and worth the final outcome.

Students and teachers frequently exchanged roles during this project and an increased sense of community was the result. Teachers are no longer seen as "the keepers of the answers". An often heard statement around the school, "we are all in this together", took on a more significant meaning.

The activities of the Hiram Bridge Project confirm our belief that discovery takes time. Students must be allowed time to explore, create and recreate. Through this process they take ownership of self-made discoveries and make meaningful connections to the real world. When students are given the opportunity to learn in this way, they learn effectively and beyond the scope of a more traditional curriculum.

> ***A group of girls, who did not feel their point of view was being heard by the boys in their respective companies, asked to be allowed to form their own, all-girl company. They defended the request with a thoughtful argument, formed a new company and proceeded to win the competition that year.***

Funding for the Hiram Project

Funding was provided by the Maine Arts Commission, the Presidential Award for Excellence in Teaching Mathematics (National Science Foundation), and donated professional time from Frances Eberle and all Hiram teachers.

Bridge It

Company Principals Worst Nightmare Inc.
Project Director Amber Snyder
Carpenter Kris Haley
Accountant Justin Romeski
Architect Kenny Harmon

1. Predict the total weight that it will require to collapse your bridge. 750 grams.

2. How could you have made your bridge stronger within the limits of the specifications? We would have built a top like a road bed.

16 3. Would your bridge hold more if the weight could be suspended from another location on the bridge? Where? yes the pers
Why? They have suport unlike the middle They are suport!

4. What was the most difficult problem that your company confronted? The 6% sales tax.

Were you successful in solving the problem? yes Why or why not? Because we had to deal with it or bank rupt.

Bibliography

All About Bridges. Bohemia, NY: Rainbow Educational Video, 170 Keyland Court, Bohemia, NY 11716, (516) 589-6643. Videocassette.

American Institute of Architects, Instructor Education Service, *Learning by Design. Why do Buildings Stand Up.* Washington, DC: American Institute of Architects, 1988.

Boring, M. *Incredible Constructions and the People Who Build Them.* New York: Walker, 1984.

"Bridges," *Exploratorium Quarterly* vol. 11, no. I. 1, (Spring, 1987).

Chadwick, Eileen. *London Bridge.* London: Collins Educational, 1990.

Dixon, Malcolm. *Structures.* New York: Bookwright Press, 1991.

Fitzpatrick, Julie. *Towers and Bridges.* Englewood Cliffs, NJ: Silver Burdett, 1988.

Gaff, Jackie, ed. *Building Bridges and Tunnels.* New York: Warwick Press, 1991.

James, Albert. *Structures and Forces: A Unit for Teachers.* Milwaukee: Macdonald-Raintree, 1982.

Pitsco, Inc. *The Pitsco Bridge Book.* 1989.

Pollard, Jeanne. *Building Toothpick Bridges.* Palo Alto: Dale Seymour, 1985.

Robbins, Ken. *Bridges.* New York: Dial, 1991.

Salvadori, Mario. *The Art of Construction.* Chicago: Chicago Press Review, 1990.

_____. *Why Buildings Stand Up.* New York: W. W. Norton, 1980.

_____ and M. Levy. *Why Buildings Fall Down.* New York: W. W. Norton, 1992.

St. George, J. *The Brooklyn Bridge: They Said it Couldn't be Built.* New York: Putnam, 1982.

Wilson, Forrest. *What it Feels Like to be a Building.* Preservation Press, 1988.

Young Designers
Dresden Elementary School

Project Overview

The Young Designers Project began in the spring of 1992 when a parent from Dresden Elementary School asked us to teach architecture as part of an integrated unit on the environment. This 4 week project lead to our teaching design at the school for the next two years. Dresden Elementary is a small (130 average) rural school and its greatest resources are the teachers, parents, a beautiful natural setting, and a town rich in architecture.

A special opportunity arose when our firm was selected to design the Children's Discovery Museum in Augusta. Through us, the Dresden Elementary School children could participate in a real project. After six months of design education they had the tools and the confidence to make a real contribution. This year students have continued to develop exhibits at the museum through their own studies. Their work enhances other childrens' learning experiences at the museum. The integration of school and community can be very meaningful to children who feel left behind in our fast paced, media driven culture.

Teaching design at the school has evolved. The project lasted 7 months each year and all grades participated. With the teacher's support we have built on past work, both physically and conceptually. During the first year graphics and other 2D design were studied. In class sessions teachers and architects integrated topics the classes were already studying with the study of graphics. This prepared students for a workshop with a guest designer who showed her work and led hands-on activities for 2-3 grades at a time. Students designed a poster announcing the year's sequence of design studies and the monthly visiting guests. The following year we worked with each grade for a month at a time, visiting each class for 2 or 3 sessions. This method was preferred by the younger grades (K-2) but the older students missed the opportunity of mixed age workshops and peer teaching that had developed previously. By this time, the children throughout the school had a working vocabulary of architectural terms and a heightened sensitivity to their environment. Each teacher used the design education differently to enhance his/her curriculum.

Key Collaborators

Wiebke Theodore,
Architectural Designer with the firm of
Theodore +Theodore Architects
Dresden, Maine

Steven Theodore,
Registered Architect with the firm of
Theodore + Theodore Architects
Dresden, Maine

Julie O'Brien
Director, Children's Discovery Museum
Augusta, Maine

Carol Sheloske	Grade K
Roberta Hart	Grade 1
Linda Herschenfeld	
Sarah Crawford	Grade 2
Barbara O'Hare	
Robin Fairservice	Grade 3
Kathie Snyder	Grade 4
Mary Griffith	Grade 5
Kellie Ketchen	Grade 6

Guest Presenters

Al Borgese
Exhibit Designer

Charles Duvall
Architect, Tent Designer

Glen Jacobs
Excavator

John Madore
Electrician

Martha Oatway
Graphic Artist

Paul Ruff
Contractor

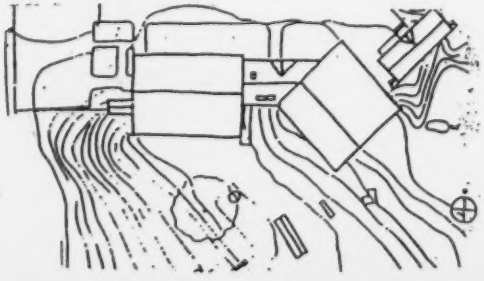
David Stenstrom
Furniture Designer

David Willauer
Planner

Elenor Everson, Doris Souveny and Inge Foster
Local Historians

Activities

The following activities took place during three years of design study at Dresden Elementary School. They represent an expanding view which progresses from individual to classroom, to school, town, community, and urban center. The activities highlighted for this document involve the playground, town, and Children's Discovery Museum.



All grades:

I. Two Dimensional Design

— Show slides of buildings. Trace shapes.
— Collage street-scapes out of geometric shapes.
— Graphic design: posters and calenders.

II. 3D and Small Object Design

— Analyze materials used in the school.
— Design furniture.
— Grab bag of building materials.

III. Structures

— Acting out structures, such as arches, and post and lintels.
— Use simple materials to build structural types, i.e., make tetrahedrons with single sheets of paper.
— Study of bridges.

IV. Built Environment

— Cereal box houses.
— Draw / build a dream room.
— Drawing plans, elevations and sections.

V. Town Heritage

— Adopt a building.
— Neighborhood discovery tour.
— Architectural handbook.

VI. Neighborhood Future

— Design neighborhood improvement.
— Map neighborhood, now and then.
— Town models, imaginary and real.

VII. Exhibits as Communication

— Museum Design in model and drawings.
— Design a "Design Arts" Exhibit.

6th grade:
Create exhibit on river fish for museum.

5th grade:
Implement and refine students designs for gazebo that was developed in Spring '92, to be used as place for quiet study on the playground.

4th grade:
Produce, in collaboration with the 3rd grade, a schematic master plan for the school playground with a focus on the equipment.

3rd grade:
Produce, in collaboration with the 4th grade, a schematic master plan for the school playground with a focus on the landscape.

2nd grade:
Model making based on the architecture of Mexico.

1st grade:
Building for a "bird client".

K:
Building a scale model of the town center.

Activity I.
THE SCHOOL'S EXTERIOR ENVIRONMENT:
What is landscape architecture?

Through a study of public or shared space, students gain an understanding of the design process. Students are in a position to influence how that space evolves.

A. Start with a 1/20"= 1'-0" site plan of the playground.

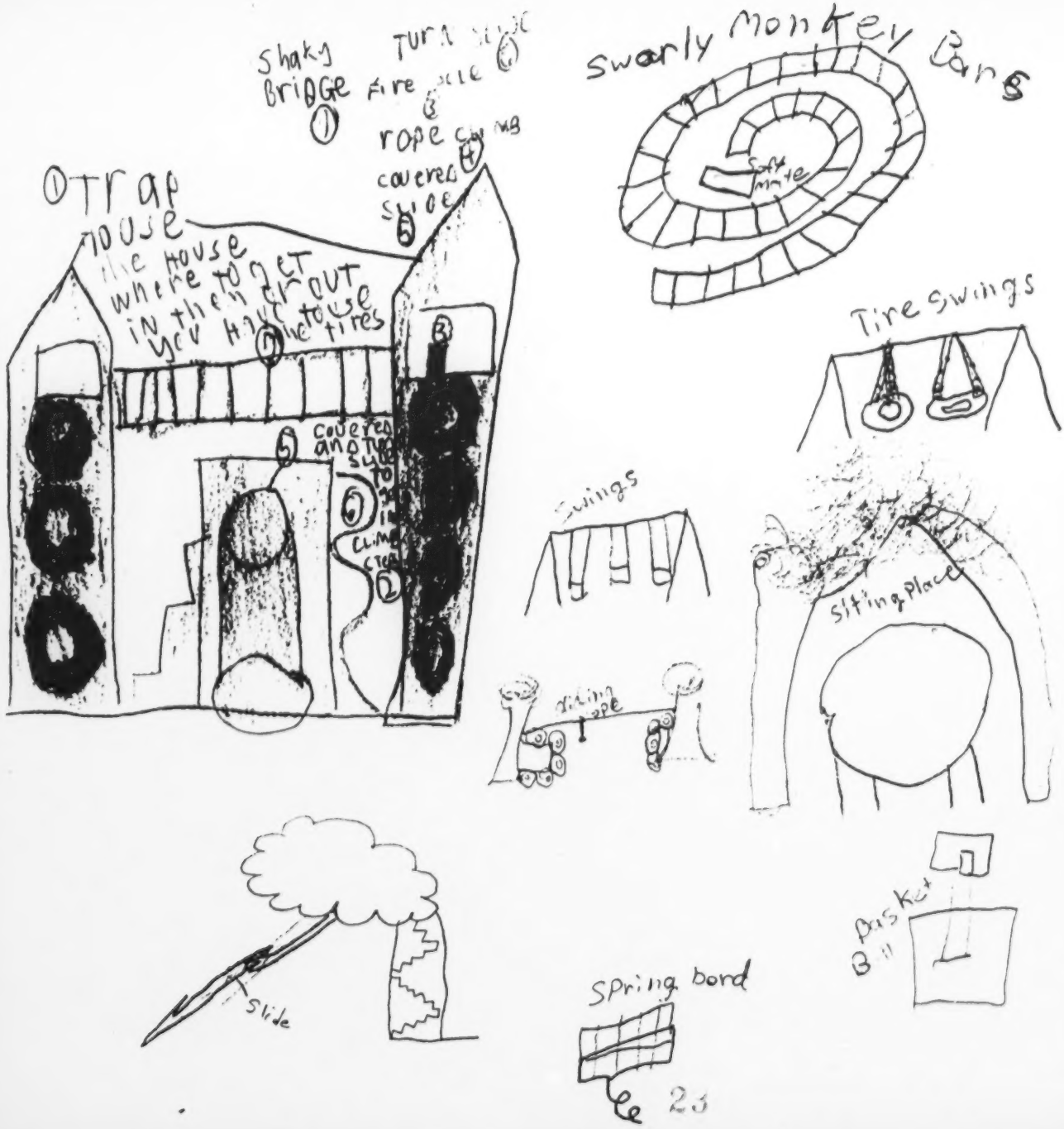
— Color in the school roof.
— Locate north and compare with a compass reading.
— Draw existing features.
— Make clay/wood models from drawings

B. Consolidate research and generate ideas based on findings.

— Draw plans and elevations.
— Consider available materials.
— Write stories.
— Make a master plan.

C. Help raise funds to realize a project.

— Make posters using student drawings of playground.
— Have students present work at a community event.


Shaky Bridge
Fire
rope
covered slide
Trap house
the house where to get in the house in yer hair out
tires
covered and
Swarly Monkey Bars
Soft Sand
Tire Swings
Swings
sliding rope
sitting Place
Slide
Basket Ball
Spring board

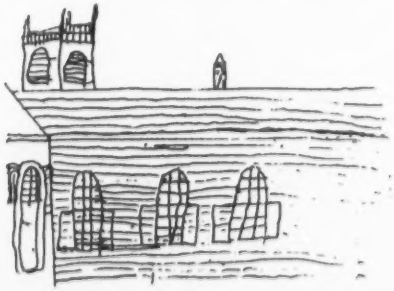
Activity II.

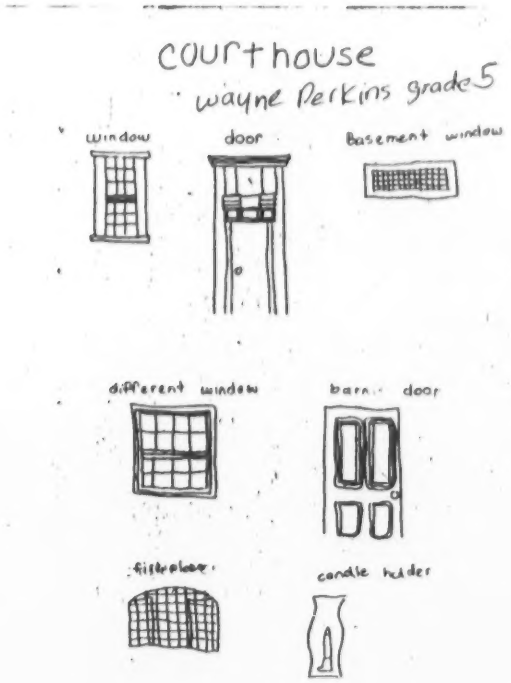
OUR TOWN: Preservation and Planning

Through a study of one's community, history unf
Students gain a new understanding of architectu
how space is defined.

A. Field trips into town.

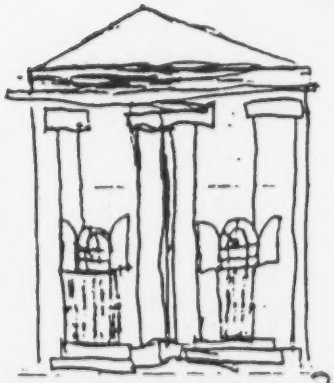
- — Maps— Compare the information on:
- — Historical, Tax, USGS, and aerial photographs.
- — Interview and analyze space: sounds and smells.
- — How does it make you feel and what doe look like?
- — Sketch buildings and focus on details.
- — Figure out the age of the building by comparing features to a style chart.





B. Reconstruct the Village to scale in the school gym.

- — Look at old photographs.
- — Gather information on a given structure in teams.
- — Build models from appliance boxes and construction paper.
- — Make roads out of black paper.
- — Discuss why some buildings no longer exist, why buildings are located in specific places, and how the future may be.
- — Discuss the Town's Comprehensive Plan.



The Design Arts Exhibit

Our Story

This exhibit was orginally built to serve as a classroom computer station or at times a stage prop, but we had so much fun designing and building it, we knew we just had to share it with you! Our school did a Young Designers project this year. Look at all of the neat projects we did. Maybe they will give you ideas for your school to come up with its very own exhibit design next year?

Another thing we did was we helped design the Museum. We built models, looked at the space, drew diagrams, took pictures and then finally presented them to our client. Here's a fun thing to do! Look at our models and drawings and see what ideas have been used in the real thing! Go on an idea scavenger hunt. Compare these thing with our ideas. How are they the same? How are they different?

Now it's your turn. The museum wants your ideas and input. What do you think of the museum? You're the designers now, so sit yourself down at our drawing table. Use these tools that real live designers use and draw. There is a box to deposit your drawings if you want.

So look around. Draw. Use the tools. I'll bet your ideas will start coming. Maybe you'll even start a design project at your school. I hope you have as much fun as we did.

Good luck!

Great Ideas

Activity III.

GETTING INVOLVED: Real projects

Through active participation in the design process students can help to create a better place for others and gain confidence in themselves.

A. Work with a local cultural institution on a building project.

— Visit the site. Analyze verbally and in drawings.
— Establish a program.

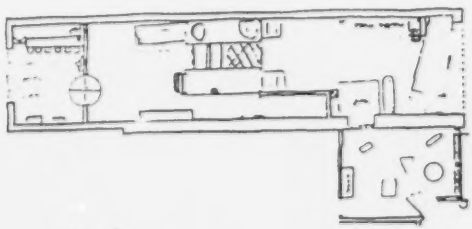
The Children's Discovery Museum in Augusta had students participate in the design of the Museum interior prior to construction. The children documented the raw space.

B. Using 1/4"=1'-0" floor plans:

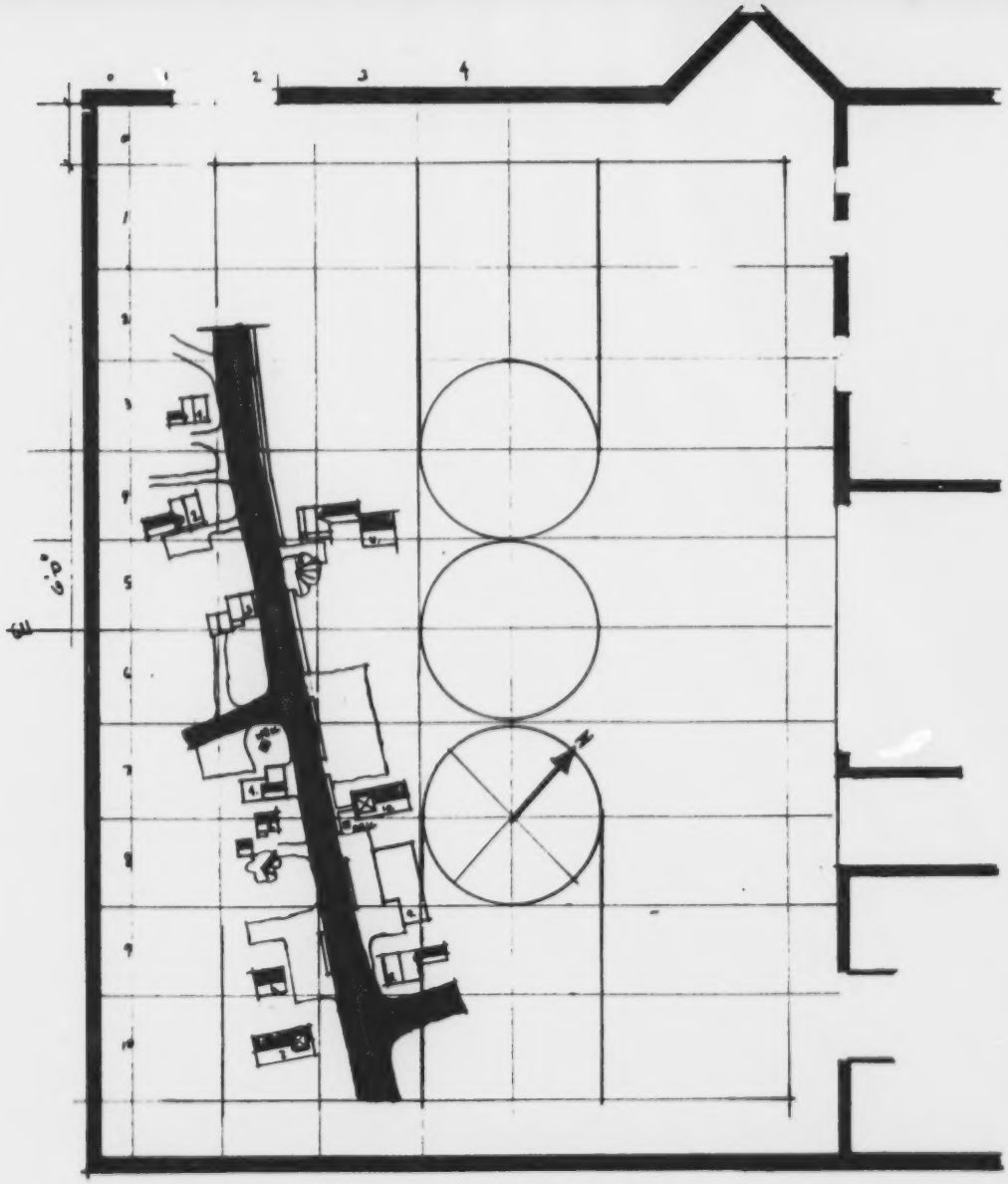
— Build models.
— Develop concepts, themes.

C. Follow-up with actual plans.

— Compare photos prior to renovation.
— Scavenger hunt for elements in project.



BEST COPY AVAILABLE



MULTI - PURPOSE ROOM PLAN 1/8" = 1'-0"

W/ DRESDEN VILLAGE

The students have continued their involvement at the Museum, most recently by developing an exhibit on River Fish.

Summary Comments

Wiebke and Steven Theodore,
Theodore + Theodore Architects

Integrating design into the curriculum, with an emphasis on process, empowers children. We became a team, with the teachers and students, to better understand our environment, so that we can be active participants in shaping it. Teachers need support, and expanding the classroom into the community and vice versa can foster this. As architects, we take an idea through to built form. Working with us, the children go through a similar process when learning about design.

Kellie Ketchen, 6th grade teacher and
Kathie Snyder, 4th grade teacher:

There are a number of learnings to share. The first is that design and design concepts are all around us. Awareness of these becomes an integral part of you and your teaching. Secondly, both the students and the adults involved learned from taking an idea from the abstract state to one of concrete reality. This also brought to focus the processes between. For the students, it became a way of connecting their classroom, school, home, and the community at large.

Funding for the Dresden Project

Maine Arts Commission
Kenyon Fund
Bridge Academy
Children's Discovery Museum
Maine Yankee
Dresden Elementary School PTF

Bibliography

Worcester Heritage Preservation Society has a good many programs on the built environment including the program: *Building Encounters of a Special Kind.* Worcester Heritage Preservation Society, 71 Pleasant Street, Worcester, MA 01609. Telephone: (617) 754-8760.

Abhau, Marcy, ed., with Rolaine Copeland and Greta Greenberger. *Architecture in Education: A Resource of Imaginative Ideas and Tested Activities.* Philadelphia, PA: Foundation for Architecture, 1987.

Baratloo, Mojdeh. *Architecture Education For Children, Community School District Six, New York City, 1986-1989.* New York: New York Foundation for the Arts and Community School District Six.

Ching, Franas. *Architecture: Form, Space & Order.* New York: Van Nostrand Reinhold, 1979.

D'Alelio, Jane. *I Know that Building!* Washington, DC: The Preservation Press, 1989.

Isaacson, Philip M. *Round Buildings, Square Buildings, & Buildings that Wiggle Like a Fish.* New York: Alfred A. Knopf, 1988.

Mendoza, George. *Need a House Call Ms. Mouse.* New York: Grosset and Dunlap,1981.

Pacific Domes. *Domebook 2.* Bolinas, CA: Random House, 1971.

Worcester Heritage Preservation Society. *Building Encounters of a Special Kind.* Worcester, MA.

Bowdoin Central School Students design a new school

Project Overview

What would your ideal, new school look like? We asked 5th and 6th graders at Bowdoin Elementary School to form themselves into architectural firms and to design and build a model of their ideal school—based on a real set of space needs. The students were given 8 days to develop their ideas, draw up plans and build a model school. Students had some background after completing a unit on "structures".

Most of the firms worked on this project nearly full-time through the school day. Guidance and direction was provided by the teachers, the assistant superintendent and by visiting designer, Brian Kent. The results were amazing. Eight schools were created and each team produced: a firm logo, a list of team members (with professional "titles"), a purpose statement, a cost estimate, plan drawings and a cardboard model.

Bowdoin Central School is a small rural school for grades K-6. There are 250 students and 60 participated in this project. They came from 3 classrooms —grade 5, grade 6 and a combined 5th/6th grade class. Most of the students are 10 to 12 years old.

Primary Learning Objectives

— to show the multi-disciplinary nature of building design, which involves math, writing, drawing and science skills, and requires a cooperative (team) working environment;

— to involve students in a community project that had meaning in their lives—the design of a local school, for them;

— to bring design issues and a design professional into the classroom so that students are exposed to new ideas and fresh ways of applying classroom skills;

— to "stir the pot," provide a break from the routine and an opportunity for some students to shine in a different classroom environment;

— to demonstrate the value (and pitfalls) of working together as a team in which all members contribute to the project's success.

Subject Areas

The project was designed to integrate all subject areas especially math and science, because Bowdoin is participating in the "Beacon School" project. (The school received a National Science Foundation Beacon grant in math and science to involve students in working on problems in their own communities.) Our assumption was that the design process would have to draw upon certain skills, and that students would unselfconsciously apply math, science, language arts, drawing, communication and writing skills in order to succeed. And that is what happened.

Classroom Equipment

A conventional, sit-at-your-desk, classroom atmosphere was not envisioned for this project. A flexible, free-form approach was essential because students had to meet as architectural firms, split up to take on an individual assignment and regroup to build model components. Desks and chairs were moved around, floor space was used for model making and one firm took over the nurse's office for their discussions!

Who Made it Work?

This collaborative project worked because the adult participants shared common goals and believed (or at least hoped!) it would work. The people involved include:

— Bette Manchester (Principal), "Just do it!" may be her credo. Bette believes that "restructuring" is an action word. She gave teachers the freedom to experiment and try the untried; i.e., devote 8 full days to a design project.

— Teachers Bill Hale (5th and 6th grade), Tom Millay (5th grade) and Kathy Martin (6th grade) helped plan, took risks, worried and persevered. But best of all, they prompted, cajoled, pushed and stretched the students so that they, the students, believed they could actually design and build a model school in 8 days.

— Brian Kent (design professional with degrees in Architecture and Urban Design) acted as an in-house consultant to teachers and students alike. His role was to help plan the project, consult with each firm and provide broad guidance at critical junctures so that everyone understood key design concepts. For example: what scale do we draw our plans? How do we plan a school? What is an elevation or a section? How does the roof stand up? Why windows? etc.

We spent 5 hours planning and discussing this project before beginning. Brian spent 10 hours in the three classrooms on 4 occasions. Engineers from Wright/Pierce were involved in initial discussions and acted as consultants throughout.

Project Diary: Brian Kent, Design Consultant

February 1993

Beacon Schools project participants (teachers and community residents) met to review program to involve students in an integrated approach to learning — to make math and science subjects, in particular, relevant to community events.

March 5, 1993

Bowdoin staff, parents and professionals brainstormed ideas for elementary school program involving the design of a new school.

March 19, 1993

Met with 5th and 6th grade teachers to plan an 8-10 day course on school design to teach students about measured drawings, space planning, structural form and building space programming and design. Decided to have students form architectural firms. Discussed concepts that must be made known to the students.

March 24, 1993

Presented introductory slide show, "House Designs from Around the World", showing over 100 house designs to all 5th and 6th grades. Challenged students to think about why Maine houses are what they are—why steep roofs, clapboards, cellars?, etc.

April 4, 1993

Introduced project to students. Assistant superintendent discussed the space needs program (see Building Specifications list). Students formed architectural firms and selected Chief Executive Officers (CEO's) who then "hired" professionals (i.e., engineers, architects, draftsmen, etc.) for their firms. Began to figure out room dimensions and draw them to scale on graph paper.

April 6, 1993

Spent 3 hours with different student architectural firms. Worked with each team to: review the architectural program for their school design; listen to their approaches to design; critique their preliminary plans and ideas; and suggest different approaches and ways to think about and organize the different elements, i.e., classrooms, library, cafeteria, gym, etc.

April 9, 1993

Presented a series of sketch diagrams to illustrate key design principles and show students how to "see" and draw in three dimensions. Diagrams consisted of:

— simple examples of how to organize spaces (i.e., classrooms) around passageways of different configurations (I, U, T, etc.);

NEW BOWDOIN CENTRAL SCHOOL

BUILDING SPECIFICATIONS

Number of Rooms	Space Needs
10	Classrooms: 750/800 square feet
1	Library: 1,000 sq.ft. (plus 550 sq.ft. workspace)
1	Special Ed: 50 sq.ft. per pupil (800 sq.ft.)
2	Kindergarten: 1,000 sq.ft.
1	Art: 1,200 sq.ft.
1	Computer Room: 30 sq.ft. per pupil (+/-20 pupils)
1	Music: 800 square feet
1	Science Lab: 800 square feet
4	Administration: (guidance, teacher's room, health, principal) 2,000 sq.ft.
1	Cafeteria: 10 sq.ft. per pupil
	Auditorium: 7 sq.ft. per person (plus stage area 600 sq.ft.) 1 parking place for every 3 people in auditorium
	Gymnasium: 54' x 76' (4,200 sq.ft.)
	20% of space in building for hallways and bathrooms
	Plan for 315 pupils in grades K-5

— plans to show how to combine and link passageways to achieve a logical school plan;

— examples of sections through a school building to show its structure and to show how to create building elevations;

— showing students how to create an axonometric (3D sketch) from a plan drawing.

Spent time working with different firms, helping them work up (or work out) details of their plans, models and sketches. Most groups had successfully produced scale plans, using their calculators to size spaces and

make cut–out rooms. They used graph paper and corrugated cardboard for models and were encouraged to use tracing paper and magic markers. There was a great deal of interest in learning how to create 3D sketches from plans. "Awesome! Do that again!"

April 15, 1993

On parents night the architectural teams displayed models, drawings, posters and large firm banners

— the products of about 8 days of school work. There were eight teams represented and some 15 or so students were on hand to explain their plans and models. They were obviously pretty pleased with their achievements. Each group tried to have a complete display, which included:

— a firm banner and logo ("Peak Construction", "Acme"...);

— a list of all firm members and their professional titles (CEO, engineer, interior designer, architect, draftsman...);

— a purpose statement;

— a cost estimate, based on number of square feet;

— plans, on graph paper, at a scale of 1/8" = 1.0";

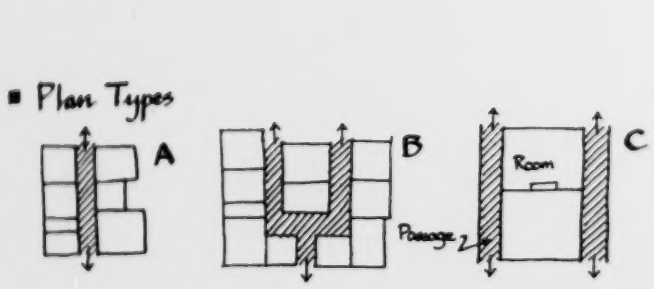
— a cardboard model, to the same scale.

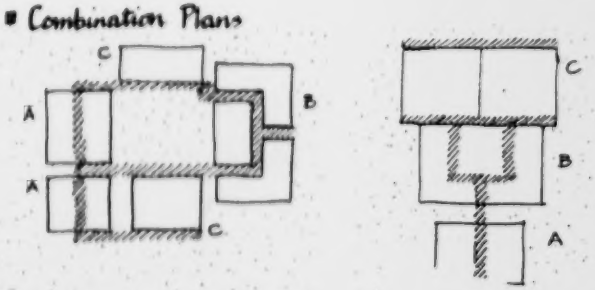
Project Strengths

— Overall, the project worked out well and was worthwhile; the students rose to the challenge and surprised us with their ability to take on a complex assignment;

— Devoting most of each school day, for eight days, to this one project proved workable, if not essential. The assignment required writing, math, drawing, model–making and, in some cases, computer skills;

— The teachers were flexible, cooperative and open to new ideas and new approaches, and felt comfortable with a design consultant participating in a fairly unstructured way.





Project Weaknesses

More time for preparation would have been useful:

— to have more materials for modeling, drawing, cutting, measuring, etc., on hand;

— to give teachers more confidence and a higher level of comfort about the project;

— to prepare students with the skills they need; i.e., math and, model building skills.

Also, we could have spent more time on the project in general, and more time on model making, i.e., gathering better model materials.

"An issue that came to light on this project was the fact that no girls applied to be CEO's of the architectural firms. This is definitely a reflection of how girls feel in the area of math and science. To offset this, we spent time encouraging girls to apply. This eventually worked and several girls submitted their names. They were voted as heads of two out of eight firms - still not equitable but a start. Those two firms prospered under the leadership and won the award for the best design and construction. The class definitely benefited through this lesson. Everyone commented on how well they (the girls) ran their companies and helped everyone work together."

Kathy Martin
6th Grade Teacher

Materials Used

- calculators
- graph paper (lots!) and tracing paper
- clear sticky tape
- Elmers glue
- scissors
- smooth and corrugated cardboard
- rulers
- Mac computer (in some cases)

We should also have had on hand:

- rolls of tracing paper
- broad, color magic markers
- foam board (for models)
- matt knives
- a straight–edge ruler

FUTURE PROJECTS

Two of the other projects, involving design education, that may be tackled in the next school year include:

PROJECT 1:

The restoration and redesign of the old Bowdoin one–room schoolhouse, to create a town museum.

Background:

This old clapboard structure is vacant but restorable, located near the old townhouse cellar in which students recently conducted an archaeological dig. Historical items from the dig and from town residents could be housed in the restored schoolhouse.

Project Activities:

- learn about the structure, materials and design/style of the schoolhouse;
- conduct a measured drawing class at the schoolhouse so plans, elevations and a model can be built;
- lay out a full size plan of the schoolhouse (with masking tape) on the gym floor and then figure out a plan layout for the museum exhibits;
- develop a site landscape plan for the outside of the museum/schoolhouse.

PROJECT 2:

The establishment of playing fields, playground and nature trails on town-owned land.

Background:

Bowdoin owns several parcels of land that may be suitable for a town recreation area, but no studies have been undertaken to evaluate the sites.

Project Activities:

— review town maps of property ownership, wetlands, topography, roads, etc., and come up with siting criteria; determine the best site;

— survey the selected site; draw scale maps and record information about the site's features;

— determine what activities should take place on the site and figure out how much space is needed for each;

— design a recreation plan that shows the best way to use the land.

Summary Comments

Brian Kent, consulting designer:

Overall, this experimental project worked very well, primarily because the teachers were reasonably well prepared, open to experimentation, flexible and cooperative. They also understood the design process well enough to set up the building program specifications and explain elementary steps that needed to be taken to develop a plan and model. Further, they gave me free rein to meet with each design team, wander from classroom to classroom and also spend some instructional time at the blackboard. The friendly, casual classroom atmosphere helped the entire program flow.

Tom Millay, 5th grade teacher:

This project gave students the "real life" experience of working on a team which had to meet a goal and deadline. The students learned it is not easy to get along, identify what you're good at and find that your friends may not be the best coworkers.

Bill Hale, 5th and 6th grade teacher:

We should have given the students more direction on expected outcomes— specific things that they should produce. I could have used more design assistance. We also needed more materials.

Kathy Martin, 6th grade teacher:

This project definitely illustrates the saying, "He who teaches also learns." I definitely learned a great deal along with my students. Brian was an invaluable resource and provided me with the help I needed. I would definitely do this kind of project again, but would allow much more time for actual construction.

Bette Manchester, Principal:

"Take risks by planning backwards."

Bringing a design professional to the classroom is an example of what restructuring is all about. It pushes the envelope on the way we work with children, engaging all students in solving real problems and expecting teachers to take risks by planning backwards (identify-

ing content skills) necessary for meaningful student outcomes— constructing a scale model of a new school. Teachers at Bowdoin shared their classrooms with a designer, engineer and builder. Staff modeled the role of teacher as learner and became facilitators of learning opportunities by engaging a number of other professionals. This is real second order change.

Funding for the Bowdoin Central Project

This report on the Bowdoin Central School's student work is the first phase of a larger project designed to introduce students in 5th and 6th grade to architectural design and planning concepts. This phase lasted 4 months. The project will last 18 months. Funding was provided in part by a grant from the National Endowment for the Arts, through the Maine Arts Commission. Parents, community members and the Parent Teacher Association provided matching funds.

Bibliography

Only one book was used as a reference for teachers: *Designing Houses: An Illustrated Guide to Building Your Own Home*, by Walker & Milstein, Overlook Press, 1976. This is a simple, funky, profusely illustrated book that tells you how to make drawings, build a model and plan a building based on elementary design principles.

Project Participants:

Wiebke and Steven Theodore
Theodore + Theodore Architects
3 Alexander Road
Dresden, ME 04342
737-2131

Mark Bechtal, Principal
Dresden Elementary School
RFD 1 Box 330
Dresden, ME 04342
737-2559

Jenny Potter Scheu
Redhouse Architects
10 Danforth Street
Portland, ME 04101
773-8681

Deidre Steiner, Principal
Marada Adams Community School
48 Moody Street
Portland, ME 04101
874-8228

Cyrene Siegona, Principal
Hiram Elementary School
Main Street
Hiram, ME 04041
625-4621

Brian Kent
Planning and Design Consultant
RFD 1 Box 782
Monmouth, ME 04259
623-4883 (business hours)

Bette Manchester, Principal
(former principal of Bowdoin Central School)
Mt. Ararat High School
P.O. Box 475
Topsham, ME 04086
729-6751

Organizations:

Cooper-Hewitt Museum
Design Education Resource Library
2 East 91st Street
New York, NY 10128
(212) 860-6868

Learning by Design
P.O. Box 7305
Portland, ME 04112
773-8681

Learning by Design is a collection of architects and educators promoting good design in the classrooms.

Maine AIA (American Institute of Architects)
c/o Judy Harvie
3 Sylvan Way
Manchester, ME 04351

Funding Resources:

Major funding for Design in the Classroom was provided through the Maine Arts Commission from a Design Education grant from the National Endowment for the Arts. Designers in these projects are included in the Maine Touring Artists Roster and are eligible for funding support for their work in schools. Contact the Maine Arts Commission for info and guidelines.

Design: Margo Halverson

Maine Commission

Maine Arts Commission
State House Station #25
Augusta, ME 04333
(207) 287-2724